

Physical Therapy Approach in Conjunction with Dry Needling on Health Related Quality of Life in Patients with Temporomandibular Disorder: A Randomized Control Trial

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Abstract

Introduction: Temporomandibular disorders (TMD) are one of the commonest musculoskeletal problems in physical therapy practice. This is not only a problem of temporomandibular joint but also affect the whole nervous system. The main purpose of this study was to assess the effectiveness of physical therapy approach on quality of life in TMD patients. **Methods:** The design of the study was randomized control trail where 200 subjects with both the gender, aged between 18 to 50 years who were clinically diagnose with TMD in the Department of Physiotherapy, Lovely Professional University, Punjab. India. After preliminary assessment all the subjects were assigned into two groups namely control group and experimental group. For outcome measurement short form of health related questionnaire (SF-36) was used to assess quality of life. In this study control group was received normal home based exercise and experimental group was received physical therapy approach which consists of dry needling, muscular inhibition in combination with home based exercise. **Results:** The experimental group to whom physical therapy protocol was applied associated with dry needling was shown significant increased scores in all the domains of the questionnaire. In control group where conventional physiotherapy was applied and improvement shown only in the domain of pain but not in the other parameters in comparison with experimental group. The level significant level was considered as $P < 0.05$ for the analysis of data. **Conclusion:** The results of this study claimed that the application of a physical therapy protocol in association with dry needling was able to improve the health related quality of life in patients with temporomandibular disorders.

Keywords: Health related Quality of Life, Physical Therapy, Dry Needling, Temporomandibular Disorders.

Introduction

Now day's temporomandibular disorders (TMD) have turned into a one of the commonest problem among physical therapist as well as for dentist. [1] TMD is a cervico-canio-madibular dysfunction which not only affects the Temporomandibular joint but also affect the central nervous system. [2] The aetiology of this condition is considering "biomechanical, neuromuscular and biopsychosocial" and the condition can aggravate with emotional stress, bad posture, bad position of teeth, tooth loss, and various extrinsic and intrinsic changes of the structural components of the Temporomandibular joint. [3, 4, 5]

The main sign symptoms of TMD patients include pain in temporomandibular joint and/or muscle with or without reduced range of motion of temporomandibular joint. The symptoms included with TMD may lead a patient to changes their lifestyle due to problem in talking, impeding their ability to partake in discussing, problem in eating. This may be the responsible for the low quality of life. [6, 7, 8, 9] The American Academy of Craniomandibular Disorders (AACD) revealed that physical therapy helps to reduce neuromusculoskeletal pain, and restore the normal range of motion through alter the sensory input and reducing inflammation, coordinating and strengthening the muscular activity, and promoting repair and regeneration of the tissues. [10] A study conducted by Oliveira et al., and the result of the

study proposed that temporomandibular joint pain may impact negatively in patients with TMD. [3]

Quality of life is a broad, subjective, productive and polysomic concept which has been the subject of numerous studies in the Health area, especially directed towards people with chronic diseases, such as TMD. It is defined by the individual as an internal experience of satisfaction and well-being in their living process. [11, 12] As per the existing studies it is clear that the TMD condition is a multidimensional condition where all the components are involved. Therefore the treatment strategies require a broad multidisciplinary approach. Physical therapy in conjunction with dry needling having a vital role in the rehabilitation of these patients, since it provides pain relief, rehabilitates the neuromuscular system and restores the mandibular rest position and muscle coordination, therefore improving quality of life. [10, 13] Therefore, the main purpose of this research was to evaluate the effectiveness of a multimodal physiotherapy approach on health related quality of life in patient with TMD.

Materials and Method

The design of the study was randomized control trial where 200 subjects with both the gender, aged between 18 to 50 years who were clinically diagnose with TMD were participated in this study. All the data were obtained from the Department of Physiotherapy, Lovely Professional University, Punjab. India. After preliminary assessment they were randomly divided into two groups by using lottery method namely control group (100 subjects) and experimental group (100 subjects). Control group was received conventional physiotherapy with normal home based exercise and experimental group was received physical therapy approach made of muscular inhibition technique, dry needling and home based exercise which sets out the principles for human research protocol. [14] The study was approved by the Institutional Research Ethics Committee of the Lovely Professional University (LPU/IEC/2019/01/05) and the clinical trial registration number of the study is CTRI/2019/06/019858. All the subjects were informed about the study and written consent form was signed by the participant.

The participants were included for the study, pain and positive three finger test with limited MMO of less than 30mm (but not necessarily painful) clearly originating in

the TMJ. Those who are suffering any dental problem, headache, hypertension, diabetes, asthma, epilepsy, and trauma and surgery to the maxillofacial area were excluded from the study.

For outcome measurement short form of health related questionnaire (SF-36) was used to assess quality of life. [15] The data was collected before starting the intervention and after four weeks of treatment protocol. The SF-36 is a generic instrument composed of 36 questions and divided into eight domains: “functional capacity, limitations due to physical aspects, pain, general health status, vitality, social aspects, emotional aspects, and mental health,” with these dimensions representing basic human values relevant to the assessment of the quality of life of the general population.

Intervention

The dry needling and muscle inhibition technique were given to the experimental group where dry needling was performed on masseter, temporalis and sub-occipital muscle for first weeks for three session the in the second week muscle inhibition technique were performed for medial and lateral pterygoid, masseter, temporalis, as well as for sub-occipital muscle. Before using the dry needling the skin surfaces was cleaned by saline water the a plastic guided 40mm acupuncture needle was insert in to the tender point of the muscle and for muscle inhibition technique, ischemic sustained pressure applied on the muscle for 5-10 second. In the 3rd and 4th weeks supervised exercise were performed. The conventional physiotherapy treatment protocol received by the control group was performed twice weekly for a total of eight sessions for 4 weeks with a duration of 10 minutes of ultrasound therapy. The Biomed brand ultrasound modality was used with the dosages of continuous mode of 3MHz with the intensity of 0.6 W/cm². [16]

Data Analysis

Data was analyzed by using SPSS version 16.0. Total 200 subject's data were analyzed. Within the group comparison pair t-test and between the group comparisons unpaired t-test was used. Level of significance for this study was fixed at 5% (P<0.05).

Results

In the descriptive demographic data, no significant difference was found [Table-1]. There was a significant change in the experimental group for all the parameters of quality of life after the intervention [Table-2] but in the control group only changes found in the pain domain [Table-3]. When the post intervention data were compared between the groups, it was found that in all the parameters of experimental group were significantly different than the control group.

Table 1: Demographic characteristic of data for Control and Experimental Group

Variables	Control group	Experimental Group
	Mean \pm SD	Mean \pm SD
Age(y)	35 \pm 10.11	36 \pm 12.12
Weight(kg)	66.22 \pm 5.93	67.32 \pm 7.58
Height(cm)	163.34 \pm 8.52	164.33 \pm 7.24
Gender	Female (n=68) Male (n=32)	Female(n=70) Male (n=30)
Body mass Index(kg/m ²)	22.55 \pm 3.65	23.32 \pm 3.15

Note: y=year, kg=kilogram, cm=centimeter, m=meter

Table: 2 Comparison of health related quality of life within the control and experimental group

Group	Outcome	Pre (Mean \pm SD)	Post (Mean \pm SD)	Differences within the group	p-value
Control Group	PF	58.67 \pm 9.00	57.86 \pm 8.53	1.19	.341
	RL-PH	36.49 \pm 19.18	32.62 \pm 16.83	1.13	.441
	RL-EH	34.07 \pm 24.31	33.07 \pm 22.23	1.00	.487
	ENERGY	51.89 \pm 8.27	50.27 \pm 7.72	1.38	.342
	EWB	62.91 \pm 6.50	64.49 \pm 8.76	1.58	.233
	SF	61.73 \pm 9.77	63.37 \pm 11.56	2.64	.435
	BP	44.29 \pm 9.01	62.62 \pm 9.37	18.33	.001
	GH	54.59 \pm 7.67	53.45 \pm 9.49	1.86	.543
Experimental Group	PF	58.91 \pm 9.87	87.83 \pm 6.81	28.92	.0001
	RL-PH	35.81 \pm 16.18	86.48 \pm 13.93	50.67	.0001
	RL-EH	32.37 \pm 25.56	83.94 \pm 16.72	51.57	.0001
	EN	48.94 \pm 12.03	84.00 \pm 8.91	35.06	.0001
	EWB	60.97 \pm 7.95	83.62 \pm 5.88	22.65	.0001
	SF	60.89 \pm 8.23	83.95 \pm 10.56	23.06	.0001
	BP	43.59 \pm 12.06	83.32 \pm 12.58	39.37	.0001
	GH	55.81 \pm 8.54	86.62 \pm 9.72	30.81	.0001

NOTE. PF= Physical functioning, RL-PH= Role of limitation Physical health, RL-EH= Role of limitation emotional health, EN= Energy. EWB= Emotional well-being, SF= social life, BP= Body pain, GH= General health,

Table: 3 Un-paired t-tests for quality of life

Variables	Control Group	Experimental Group	p-value
	Post (Mean± SD)	Post (Mean± SD)	
PF	57.86±8.53	87.83±6.81	.0001
RL-PH	32.62±16.83	86.48±13.93	.0001
RL-EH	33.07±22.23	83.94±16.72	.0001
ENERGY	50.27±7.72	84.00±8.91	.0001
EWB	64.49±8.76	83.62±5.88	.0001
SF	63.37±11.56	83.95±10.56	.0001
BP	62.62±9.37	83.32±12.58	.0001
GH	53.45±9.49	86.62±9.72	.0001

NOTE. PF= Physical functioning, RL-PH= Role of limitation Physical health, RL-EH= Role of limitation emotional health, EN= Energy. EWB= Emotional wellbeing, SF= social life, BP= Body pain, GH= General health

Discussion

The result of the study showed that manual physical therapy is effective against TMD. The main purpose of this study was to evaluate the effectiveness of manual physical therapy in conjunction with dry needling to improve quality of life in patients with TMD. In this study experimental group was shown a significant improvement in all the parameter of SF-36. The result showed that there is a significant improvement in quality of life in all domains for experimental group as compare with control group. In the control group very minimal amount of improvement shown in health related quality of life for all the parameters except the domain of pain. It is because; the study found that therapeutic ultrasound has a healing effect which can effect on the pain reduction. [24] Where in experimental group, improvement shown in physical functioning 28 points, role of limitations due to physical health 50 points, role of limitations due to emotional health 51 points, energy 35 points, emotional well-being 22 points, social life 23 points, bodily pain 39 points, general health 30 points.

A retrospective study conducted by Matta et, al. [17] and conclude that multidisciplinary approach is compulsory to treat the TMD patient. They also suggest that physical modalities only can reduce the symptoms for promoting a better quality of outcome interdisciplinary approach is required. Another similar study was done by Felício et, al. in 2008, where SF-36

questionnaire was used and shown that physical therapy approach is capable to improve the quality of life in patient with TMD. [18]

Study suggested that the relaxed, gentle and gradual stimulus of the fascia and the Ruffini endings within caused the subsequent instigation of the parasympathetic nervous system, which, in turn, caused a reduction in blood pressure. [19] Kim et al. [20] observed a decrease in stress hormone (known as a cortisol) levels following self-myofascial release and it was attributed to the suppression of the sympathetic nervous system through relaxation of the fascia. Hence, it can be assumed that the relaxation of the fascia can cause instigation of the parasympathetic nervous system and decrease blood pressure and pulse rate. In addition, MFR stimulate the mechanoreceptor which creates the balance of the autonomic nervous system mechanoreceptors [21] and another author said that stretching of the deep fascia surrounding the internal organs, causing a release of neurotransmitters which can affect the cardiovascular system. [22]

It is observed that multidimensional treatment approach for multifactorial disease is still lacking in physical therapy practice for the TMD management. [23, 24] Because in the physical therapy practice only some traditional manual therapy technique like mobilization, manipulation etc. but very less study with weak methodology found that multidisciplinary approach.

The present study was a multidimensional approach where improvement has shown in all the parameters. In this context, in control group also shown reduction of pain domain, therefore ultrasound can be effective modalities to reduce pain in patient with TMD, especially for those who are suffering acute TMD with persistent pain.

Conclusion

The results of the study showed that manual physical therapy in conjunction with dry needling treatment is beneficial to improve quality of life in patients with TMD. It was concluded that the dry needling can be a part of a physical therapy management protocol for better management of patients with TMD.

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Conflict of Interest: Author does not have any conflict of interest

Ethical Clearance-Institutional research and institutional ethical committee approval were obtained before recruiting the patient (LPU/IEC/2019/01/05) for the proposed study.

CTRI Registration Number

-CTRI/2019/06/019858

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